

LIV.—On the Fructification and Affinities of *Archæopteris hibernica*, Forbes, sp. By ROBERT KIDSTON, F.R.S.E., F.G.S.*

UNDER the name of *Cyclopteris hibernica*, *Archæopteris hibernica* was described by Forbes in 1852 † from the Yellow Sandstones of the south of Ireland, where, at Kiltorkan and a few other localities, this fern is one of the most characteristic fossils.

In 1858 ‡ Mr. W. H. Baily, in describing the fructification of *Archæopteris hibernica*, Forbes, sp., said that “one of the fertile pinnules of a specimen showed the spores were aggregated into clusters or sori, and that the indusium or protecting cover had been but little broken up. A fertile pinnule from another specimen, however, appeared to be in a more advanced stage, losing in a great measure the aggregated character of the sori, and showing the protecting cases (which were granulated) to be much disturbed.

“Other specimens in the collection were alluded to, one of which, with a length of 16 inches, had twelve pinnules on each side of the rachis in full fructification without any appearance of leaflets, the spore-cases being scattered in all directions; another of the same length had about twenty pinnules on each side, the lower ones being in full fructification, which decreased gradually towards the upper portion of the frond, the leaflets taking its place.”

At the same time Mr. Baily exhibited a diagram illustrating “what was considered to be the base of the stem or rhizoma, having a rounded expansion, apparently separating into scales which continued upwards, fragments of leaflets being attached to the stem at different intervals.”

Schimper, in 1869 §, figured and described *Cyclopteris hibernica*, Forbes, under the name of *Palæopteris hibernica*. In describing the fruiting pinnules he says: “These have undergone a complete metamorphosis and are transformed into groups in which all foliar expansion has entirely disappeared, and which show a principal rachis not at all represented in the sterile pinnules which are destitute of a medial nerve.” He also describes the sporangia as clavate,

* Communicated by the Author, having been read before the Royal Physical Society of Edinburgh, April 18, 1888.

† Brit. Assoc. Report, 1852, p. 43.

‡ *Ibid.* 1858, p. 75.

§ *Traité d. paléont. végét.* vol. i. p. 475, pl. xxxvi.

costate ("soris (sporangii?) costulatis"). He gives an enlarged drawing of the sporangia at pl. xxxvi. fig. 4.

More recently Mr. Carruthers redescribed the fruit of this fern*. Among other things he says:—"In some specimens in the British Museum all the lower pinnæ are entirely fertile. I am satisfied that the ovate-oblong sori are generally single, and not clustered, and are two-lipped, the slit passing one third of the way down the sorus. The vein is continued as a free receptacle in the centre of the cup or cyst, as in existing *Hymenophylleæ*, in which it is included, not reaching beyond the entire portion. In some specimens the receptacle is broad or thick, indicating the presence of something besides itself in the cup, and giving the appearance that would be produced if it were covered with sporangia; I cannot, however, detect any indication on the outer surface which might have been expected from the individual sporangia. The compression of the specimens in the rock, which has made the free receptacle appear like a vein on the wall of the cup, together with the highly altered condition of the rock in which the fossils are contained, account for the imperfect preservation of the minute structures.

"The interpretation which I have here given of the fructification of this interesting fossil exhibits so close a resemblance to what we find in the living genus *Hymenophyllum* that, were it not for the vegetative portions, I would without hesitation place it in that genus."

Crépin †, in 1874, figured and described some specimens of *Archæopteris* (*Palæopteris*) *hibernica*, var. *minor*, from Évieux, Belgium, of which he also figures the fruit, but does not describe it in detail.

As the generic name *Palæopteris*, adopted by Schimper for this and some allied ferns, had been previously employed by Geinitz ‡ for a fossil which he supposed to be a fern-stem (but which has been discovered to be the stem of *Cordaites*), Dawson §, in 1882, proposed the name *Archæopteris* for the plants placed in *Palæopteris*, Schimper (not Geinitz). Dawson's genus *Archæopteris* must therefore be employed for *Cyclopteris hibernica* and its generic associates, as *Palæopteris*,

* Geol. Mag. vol. ix. no. 2, Feb. 1872.

† "Description de quelques plantes fossiles de l'étage des psammites du Condroz (Devonien supérieur)," Bull. Acad. roy. d. Belgique, 2^e sér. vol. xxxviii. no. 8, Aug. 1874.

‡ Vers. d. Steinkf. in Sachsen, p. 32; see also Grand'Eury, 'Flore carbon. du Départ. de la Loire,' pp. 241 and 243.

§ Foss. Plants of the Erian (Devonian) and Upper Silurian Formations of Canada, part ii. p. 98 (1882).

Schimper, is inadmissible, having been previously used by Geinitz for a different group of plants.

Among the Canadian species described by Dawson the point of chief interest to us is the figure and description of the fruit of *Archæopteris gaspiensis*, a very closely allied species, if really distinct from *Archæopteris hibernica*, Forbes, sp. His description of the fruit is as follows:—"Fertile pinnæ with about twelve pinnules, each having a long midrib with about seven pairs of crowded oblong spore-cases about 3 millim. in length, pointed or somewhat obtuse at top, straight at the sides, and apparently dehiscent at the apex. The midrib projects some distance beyond the spore-cases." It is further mentioned that *Archæopteris gaspiensis* "differs from *A. hibernica* in the arrangement and form of the spore-cases and in its shorter pinnæ, with fewer and less obtuse pinnules"*.

Since examining the specimens of *Archæopteris hibernica* in the British Museum I have doubted the accuracy of the description of the fruit of this fern as given by Schimper and Carruthers, but refrained from expressing any opinion till I had an opportunity of examining the specimens of this plant in the collections of the Science and Art Museum, Dublin, and of the Geological Survey of Ireland. I have now examined these specimens, and feel convinced that the description of the fruit as given by Schimper and Carruthers is inaccurate. I have entirely failed to observe the presence of a keel on the sporangia, as figured by Schimper, or the occurrence of a "slit passing one third of the way down the sorus," or any of the other Hymenophyllaceous characters mentioned by Mr. Carruthers. The sporangia (so far as my observations have gone, and I have examined minutely the specimens in the British Museum, as well as those in the two collections in Dublin, the finest of which are in the collection of the Geological Survey of Ireland) are narrow-oval, sessile, or very shortly stalked, as a rule pointed at both extremities, though occasionally blunt; they are usually developed singly, though occasionally in pairs, and are apparently produced on the upperside of the rachis-like vein of the very much metamorphosed pinnules, which in this case almost assume the structure of pinnæ, though their being only modified pinnules is proved by their position and by the occasional occurrence of a few sporangia on the margin of some of the foliage-pinnules, which, in the few such cases observed, had undergone but little reduction in the limb of the pinnule. A similar production of sporangia on the

* Dawson, *l. c.* p. 99.

incompletely modified foliage-pinnules is not uncommon in *Osmunda regalis*. The fruiting-pinnules end in several simple or divided thread-like filaments. The fruit appears to consist of *exannulate Marattiaceous sporangia*.

Another interesting point was observed on some of the specimens in the collection of the Geological Survey of Ireland. This had evidently been noticed by Mr. Baily, though its importance was not fully appreciated, and is referred to by him as a rounded expansion of the base of the stem, which apparently separated into scales. Mr. Carruthers, evidently referring to the same structure, says "The stipes were thick, of considerable length, and clothed with large scales, which formed a dense covering at the enlarged base" *.

The structures here alluded to are two large *stipules*, one on each side of the base of the rachis, and on some of the specimens in the collection of the Geological Survey of Ireland they are admirably shown. What has given rise to the statement that the base of the stipe was "clothed with large scales" is evidently the remains of large pinnules which are situated on the main rachis between the pinnae, and are continued to almost the extreme basal termination of the rachis. Such pinnules, obliquely imbedded in the matrix and broken over, have been mistaken for scales. So far as my observations have gone, the rachis is entirely destitute of membranous scales.

The presence of the *stipules* at the base of the rachis of *Archæopteris hibernica*, altogether independently of the evidence afforded by the fruit, points strongly to its affinities being with the Marattiaceæ; and when to this is added the *Marattiaceous* structure of the fruit itself, there does not remain the slightest doubt in my mind that the true position of *Archæopteris hibernica* is in the Marattiaceæ.

In conclusion, I have to express my thanks to Dr. A. Geikie and Prof. Ball for all the facilities they kindly gave me for examining the specimens in the respective collections of the Geological Survey of Ireland and in the Science and Art Museum, Dublin.

LV.—*A List of Batrachians from the Province Santa Catharina, Brazil.* By G. A. BOULENGER.

Two rather extensive collections of Frogs, formed in the Sierra do Catharina by Hr. Michaëlis, which I have recently

* Carruthers, *l. c.*